S/564/57/000/000/015/029
D258/D307

Artificial fluorite...

and $\sim$130 mμ in natural crystals. The properties were improved by adding $\sim$0.01% of lanthanon fluorides to the initial charge. There are 7 figures.

Card 3/3

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001653210004-9"

20815

S/048/61/025/003/003/047
B104/B201

9,6150
24,3500 (1137,1138,1395)

AUTHORS: Vasil'yeva, M.A., Kuprevich, V.V., Stepanov, I.V. (Deceased), and Feofilov, P.P.

TITLE: Single-crystal cathodoluminescence screens

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25, no. 3, 1961, 321 - 323

TEXT: This is a reproduction of a lecture delivered at the 9th Conference on Luminescence (Crystal Phosphors), which took place in Kiyev from June 20 to 25, 1960. The authors developed and studied single-crystal cathodoluminescence screens, prepared from fluorite (CaF_2), fluorostrontium and fluorobarium, and activated with uranium and various rare earths (Sm, Eu, Tb, Dy, Ho, Er, Tu). The single crystals were bred in accordance with Bridgman and a method proposed by I.V. Stepanov. The activator was deposited in the form of a first layer of UO_2F_2 or fluorides of the rare earths. The green luminescence of uranium-activated screens could be excited by an electron beam or by ultraviolet light. The color of screens activated with

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20815

S/048/61/025/003/003/047
B104/B201

Single-crystal cathodoluminescence ...

rare earths changed somewhat on the passage from fluorides to fluorostrontium or fluorobarium, and a variation of the rare earths gave rise to various colors of the luminescence. The spectra of cathodoluminescence of the screens were found to be practically identical with the spectra of photoluminescence. The single crystals of the fluorides of alkali-earth metals possess a low surface conductivity, and therefore the screens were provided with silver or aluminum films at the excitation side to prevent them from being charged electrically. As an example, results concerning the CaF_2-Eu screen are graphically illustrated in Figs. 1 and 2. Fig. 1 shows the light yield of the cathodoluminescence of this screen as a function of the activator concentration at electron excitation (11 kv, $j = 10^{-7}$ a/cm^2). Fig. 2 shows for two screens the resolution μ as a function of the electron energy at a current density of $j = 10^{-8}$ a/cm^2. The temperature extinction of luminescence and the duration of the afterglow were determined under ultraviolet light. Apart from the CaF_2-Eu screen, where a temperature extinction was observable at 50°C, no extinction was observed in any of the other screens up to 200°C. The afterglow in Eu-activated screens lasted 10^{-7} seconds, and 10^{-4} seconds in uranium-activated ones,

Card 2/4

S/048/61/025/003/003/047
B104/B201

Single-crystal cathodoluminescence ...

while these times ranged between 10^{-2} and 10^{-3} seconds with the other screens. When rigorous breeding conditions were observed, screens under the action of electron rays with current densities of 10^{-7} - 10^{-8} a/cm^2 conserved the brightness of luminescence for dozens of hours. The screens described are very stable against atmospheric actions and temperature fluctuations. There are 2 figures and 6 references: 4 Soviet-bloc and 2 non-Soviet-bloc. The 2 references to English language publications read as follows: Bridgman P.W., Proc.Amer. Acad.Sci., 60, 306, (1925), Stockbarger D. J., Opt. Soc. America, 39, 731, 1949

Card 3/4

STEPANOV, I.V.

Sodium carbonate salinization of the soils in the Khachinchay alluvial cone, Kura-Aras Lowland. Pochvovedenie no.1:32-37 Ja '64. (MIRA 17:3)

1. Sredneaziatskiy institut lesnogo khozyaystva.

[illegible], Vladislav Vladislavovich; [illegible], Valentina Sergeyevna; [illegible], Igor' Vasil'yevich; KUZNETSOV, S.S., doktor geol.-miner. nauk, prof., otv. red.

[Volcanic-siliceous group of the formations of the Sakmara zone in the western slope of the Southern Urals] Vulkanogenno-kremnistaia gruppa formatsii Sakmarskoi zony na zapadnom sklone IUzhnogo Urala. Moskva, Nauka, 1964. 66 p. (MIRA 17:10)

ACC NR: AP6035819 SOURCE CODE: UR/0413/66/000/020/0019/0019

INVENTOR: Klimkovskiy, B. M.; Tkachenko, A. S.; Bondarenko, A. G.; Stepanov, I. V.

ORG: None

TITLE: A device for balancing forces of inertia. Class 7, No. 186952

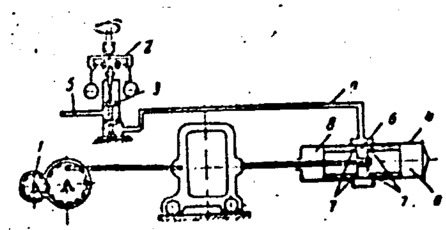
SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 20, 1966, 19

TOPIC TAGS: rolling mill, cold rolling, pneumatic servomechanism

ABSTRACT: This Author's Certificate introduces: 1. A device for balancing the forces of inertia generated during reciprocating motion of the stand in a cold-rolling tube mill. The unit contains compensating pneumatic cylinders with pistons. The initial pressure is automatically controlled with respect to the rate of rolling. The installation is equipped with a centrifugal pressure regulator connected to the drive shaft of the stand. The regulator valve connects the compensating cylinders to the air line. 2. A modification of this device in which the make-up feed to the compensating cylinders is simplified and made more reliable by elongating the piston slides which act as the make-up valve and equipping them with ports which connect the cylinder cavities to the make-up line.

Card 1/2 UDC: 621.771.06-755-589.4

ACC NR: AP6035819



1—drive shaft of the stand; 2—centrifugal pressure regulator; 3—valve; 4—compensating cylinders; 5—air line; 6—piston slide; 7—ports; 8—cylinder cavities; 9—make-up line

SUB CODE: 13/ SUBM DATE: 04Sep65

STEPANOV, K.

Acquaint the people with everything that is best. NTO 2 no.1:34-35 Ja '60. (MIRA 13:5)

1. Uchenyy sekretar' soveta pervichnoy organizatsii Nauchno-tekhnicheskogo obshchestva mashinostroitel'nogo zavoda, g.Serdobsk, Penzenskoy oblasti.
(Serdobsk--Machinery industry)

STEPANOV, K.

Making an amplifier for the galvanometer. IUn.tekh. 6 no.9:79-80 S '61. (MIRA 14:10)
(Scientific recreations)

STEPANOV, K., yurist

Aid payment while undergoring prosthesis. Okhr.truda i sots. strakh. 5 no.4:38 Ap '62. (MIRA 15:4)
(Prosthesis) (Insurance, Accident)

STEPANOV, K., inzhener-arkhitektor

Characteristics of construction in districts of the Far North.
Zhil. stroi. no.11:14-16 '64 (MIRA 18:2)

USSR / Virology. Human and Animal Viruses. General Problems. E

Abs Jour: Ref Zhur-Biol., No 2, 1959, 5292.

Author : Stepanov, A. D.; Suyerbayeva, G. G.
Inst : Not given.
Title : Methods of Storage and Transportation of Sera for Virological Analysis.

Orig Pub: Kazansk. med. zh., 1957, No 2-3, 155.

Abstract: No abstract.

Card 1/1

12

[illegible], F. [illegible], [illegible], [illegible], [illegible], [illegible], [illegible], [illegible], YU. SH.

"The study of the natural foci of tickborne encephalitis in the [illegible].
Page 60

Desyatoye soveshchaniye po parazitlobicheskim problemam i prirodnoochagovym boleznyam. 22-29 Oktyabrya 1959 g. (Tenth conference on Parasitological Problems and Diseases with Natural Foci 22-29 October 1959), Moscow-Leningrad, 1959, Academy of Medical Sciences USSR and Academy of Sciences USSR, No. 1 254pp.

STEPANOV, K.D.

Method for preparing, storing, and shipping serum for virological analysis. Voen.-med.zhur. no.7:78 Jl '59. (MIRA 12:11)
(SERUM)

STEPANOV, K.D.; BOYKO, V.A.

Two cases of parasitic larvae of Wohlfahrtia magnifica Schin in the Tatar A.S.S.R. Kaz.med.zhur. 40 no.3:76-78 My-Je '59. (MIRA 12:11)

1. Iz Kazanskogo nauchno-issledovatel'skogo instituta epid- iologii i gigiyeny (direktor - dotsent N.A.Nemshilova).
(TATAR A.S.S.R.--MYASIS)
(FLESH FLIES)

STEPANOV, K.G.

Guided by the beacon. Mashinostroitel' no.9:10 S '61. (MIRA 14:10)

1. Nachal'nik proizvodstva Stalingradskogo traktornogo zavoda.
(Volgograd--Tractor industry)

PRONIN, V.M., inzh.; STEPANOV, K.G., inzh.

Organizing intrafactory transportation on hourly schedule and along fixed routes. Trakt.i sel'khozmash. 31 no.2:3[illegible]37 F '61. (MIRA 14:7)

1. Stalingradskiy Traktornyy zavod.
(Stalingrad--Tractor industry)

STEPANOV, K. I.

Cand Biol Sci - (diss) "Formation of self-pollinating strains of corn under the influence of heterologous pollen and the synthesis of hybrids based on these strains." (Data of experimental studies 1955-1958)." Kishinev, 1961. 31 pp; with illustrations; (Academy of Sciences USSR, Inst of Genetics); 150 copies; price not given; (KL, 5-61 sup, 185)

EWG(j)/EWG(r)/EWT(l)/FS(v)-3/EWG(v)/EWG(a)/EWG(c) Pe-5 TD

L 25784-65

S/0299/64/000/020/G001/G001

ACCESSION NR: AR5000948

SOURCE: Ref. zh. Biologiya. Sv. t., Abs. 20G4

32
19
B

AUTHOR: Stepanov, K. I.

TITLE: Chlorophyll stability in an alcoholic extract

CITED SOURCE: Tr. Kishinevsk. s.-kh. in-ta, v. 34, no. 1, 1963, 170-175

TOPIC TAGS: wheat plant, chlorophyll, alcoholic extract, chlorophyll stability, fertilizer, nitrogen, phosphorus, potassium

TRANSLATION: The study investigated the stability of chlorophyll alcoholic extracts obtained at different vegetation periods from leaves of Kishenevskaya-10 winter wheat, grown in the field under different nutrition and sowing density conditions (1960) and grown in soil vegetation experiments in Mitcherlikh vessels, and also in leaves of Odesskaya-3 winter wheat grown under sandy culture conditions (1962). The basic experimental plan variants were: without fertilizer (control), 2N, 2P, 2N2P, and 2N2P2K. In 1961 different

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L 25784-65
ACCESSION NR: AR5000948

light conditions were produced by shading with 2 or 3 layers of gauze. The alcoholic extracts were kept in the dark in glass bottles with a ground glass stopper or in pycnometers (1962). The extracts were colorimetrically measured with a Dyubosk colorimeter at regular intervals. Chlorophyll alcoholic extracts were found most stable in plants of the 2N variant, and then in those of the 2N2P variant. The stability of control plant leaf extracts and of the 2P variant plants increased markedly in proportion to light decrease. Chlorophyll stability of extracts decreased with development of the plant. It is suggested that nitrogen plays a role in increasing chlorophyll stability. L. Polishchuk.

SUB CODE: LS ENCL: 00

Card 2/2

STEPANOV, K.I., dots., otv. red.; PILENKO, I.F., dots., red.; VAN'KOVICH, G.N., kand. sel'khoz. nauk; ZAGORCHA, K.L., st. prep., red.; SOKOL'NIKOV, Ye.A., dots., red.; STEPURIN, G.F., dots., red.; KARYAKINA, I., red.

[Collection of reports and communications by the students of the Kishinev Agricultural Institute] Sbornik dokladov i soobshchenii studentov Kishinevskogo sel'skokhoziaistvennogo instituta. Kishinev, Kartia moldoveniaske, 1963. 79 p. (MIRA 17:11)

1. Kishinev. Sel'skokhozyaystvennyy institut.

S/057/63/033/002/019/023
B108/B186

AUTHOR: Stepanov, K. N.

TITLE: On nonlinear longitudinal oscillations of a plasma in a magnetic field

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 33, no. 2, 1963, 246 - 247

TEXT: It is shown that the frequency of nonlinear, longitudinal oscillations of a plasma (R. V. Polovin. ZhETF, 31, 354, 1956) in a magnetic field does not depend on their amplitude, and that it is equal to the Langmuir frequency (A. I. Akhiyezer, L. E. Pargamanik. Uch. zap. Khar'kovsk. gos. univ., Tr. fiz. otd., 1, 75, 1948).

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR, Khar'kov (Physico-technical Institute AS UkrSSR, Khar'kov)

SUBMITTED: April 4, 1962

Card 1/1

STEPANOV, Konstantin Mitrofanovich; MYAGKOV, M.M., red.; MALEK, Z.N., tekhn.red.

[Introduce the achievements of science and technology into production] Dostizheniia nauki i tekhniki - v proizvodstvo. Moskva, Izd-vo VTsSPS Profizdat, 1960. 65 p. (MIRA 14:4)

1. Uchenyy sekretar' soveta pervichnoy organizatsii nauchno-tekhnicheskogo obshchestva Serdobskogo mashinostroitel'nogo zavoda, Penzenskoy oblasti (for Stepanov).
(Serdobsk--Machinery industry)
(Technology--Information services)

STEPANOV, K.M.

Was it correct to adopt this engineering decision. Elek.i tepl.tiaga. 4 no.6:44 Je '60. (MIRA 13:8)

1. Zaveduyushchiy uchebnoy uchebnoy chast'yu Omskoy shkoly meshinistov.
(Electric locomotives) (Radio--Interference)

STEPANOV, K.M.

Efficiency promoter. Mashinostroitel' no.11:3 N '61.
(MIRA 14:11)
(Serdobsk--Machinery industry--Technological innovations)

STEPANOV, K.M., inzh.

Need for an improvement of the control circuit system of the VL23 electric locomotive. Elek.i tepl.tiaga 6 no.1:44 Ja '62.
(MIRA 15:1)

(Electric locomotives--Design and construction)

ST[illegible]OV, K. [illegible].

"Some Observations on the C[illegible]rling of Tomatoe Le[illegible]ves in the District of Astrak[illegible]n," <u>Zapiski Astrakhanskoi Statnsii Zashchity Rastenii ot Vreditelei,</u> vol. 2, no. 4, 1930, pp. 41-54. 464.9 As8

SO: SIRA SI [illegible]0-53, 15 Dec. 1953

[illegible], [illegible]

"Notes on Fusarium rhizogenum Pound et Cl. in the District of Astrakhan," Zapiski Astrakhanskoi Stantsii Zashchity Rastenii ot Vreditelei. vol. 2, no. 4, 1930, pp. 55-60. 464.9 As[illegible]

SO: SIRA SI 90-53, 15 Dec. 1953

STEPANOV, V. N.

"Diseases of Apples, Pears, Plums, and Cherry Trees," Instruktsii Dlia Nabliudatel'nykh Punktov, Vsesoiuznoe Gosudarstvennoe Ob'edinenie po Bor'be s Vrediteliami i Bolezniami v Sel'skom i Lesnom Khoziaistve, Upravlenie Sluzhby Ucheta, no. 13, 1932, pp. 3-54. 464.9 V96

SO: SIRA SI 90-53, 15 Dec. 1953

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001653210004-9"

STEPANOV, N. N.

"Introduction of Measures for Control of Diseases of Orchards," Sbornik Vsesoiuznogo Instituta Zashchity Rastenii, no. 6, 1933, pp. 97-100. 464.9 L542

SO: SIRA SI 90-53, 15 Dec. 1953

STEPANOV, K. M.

"Warning Service for Spraying against Apple Scab," Sbornik Vsesoiuznogo Instituta Rastenii, no.8, 1934, pp. 103-109. 464.9. L[illegible]

SO: SIRA SI 90-53, 15 Dec. 1953

[illegible], [illegible]

"Dis[illegible]ination of Infectious Diseases of Plants by Air Currents," <u>Trudy po Zashchite Rastenii</u>, Seriia 2, no. [illegible], 1935, pp. 6-2[illegible]. 423.92 L54P

SO: [illegible] SI 90-53, 15 Dec. 19[illegible]3

STEP[illegible], K. N.

"Dissemination of Infectious Diseases of Plants by Air Currents," Zashchita Rastenii, no. 2, 1935, pp. [illegible]3-86. 421 P942

SO: SIRA SI 90-53, 1[illegible] Dec. 1953

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001653210004-9"

STEPANOV, K. M.

"Dependence of Plant Diseases on Meteorological Factors," Itogi Nauchno-Issledovatel'skikh Rabot Vsesoiuznogo Instituta Zashchity Rastenii za 1935 Goda, 1936, pp. 63-64. 423.92 L541

SO: SIRA SI 90-53, 15 Dec. 1953

ST[illegible]V, [illegible]

"Seasonal Development of Apple Scab Dependent on Weather Conditions during Spring Time," Itogi Nauchno-Issledovatel'skikh Rabot Vsesoiuznogo Instituta Zashchity Rastenii za 1935 Goda, [illegible], pp. 71-72. 423.92 L[illegible]

SO: [illegible], 15 Dec. 1953

STEPANOV, K. M.

"Spreading of Diseases of Plants Through the Air," Itogi Nauchno-Issledovatel'skikh Rabot Vsesoiuznogo Instituta Zashchity Rastenii za 1935 Goda, 1936, pp. 73. 423.92

So: SIRA SI 90-53, 15 Dec. 1953

[illegible]

[illegible], [illegible] [illegible] [illegible] Diseases [illegible] their External Symptoms, State [illegible] Publishing House of [illegible] and [illegible] Literature, Leningrad, [illegible]

So: [illegible] [illegible], 15 [illegible] 1953

[illegible], [illegible]

"The F[illegible]nosis of Plant Diseases," Zashchita Rastenii, no. 1[illegible], 193[illegible], pp. 3-14.
21 P942

SO: SIRA SI 90-53, 15 Dec. 1953

STEPAN V, [illegible]

"Winter Hardiness of Brown Leaf Rust of Wheat," Itogi Nauchno-Issledovatel'skikh Rabot Vsesoiuznogo Instituta Zashchity Rastenii za 1936 Goda, part 1, 1937, pp. 162-163. 423.92 L 41

So: TRA SI 90-53, 15 Dec. 1953

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

STEPANOV, K.M.

1

A thermostat for working at low temperatures with artificial illumination. K. M. Stepanov. *Plant Protection* (U. S. S. R.) [illegible], No. 18, 101-3.—The thermostat consists of a [illegible] × [illegible] × 80-cm. chamber surrounded on 3 sides by a cooling tank. Inside the chamber are two 200-300-w. elec. heaters (spirals covered with asbestos) which are automatically controlled by a toluene thermoregulator and a relay. The chamber is illuminated by means of a 500-w. light suspended approx. 60 cm. from the thermostat. The tank is filled with a mixt. of ground ice and salt which can keep the temp. in the chamber within ±1° at 0° or lower (a min. of −5° and −10° was obtained in the absence of the illuminating light). The introduction of a ventilator into the chamber reduces the variations of the temp. W. R. Henn

METALLURGICAL LITERATURE CLASSIFICATION

[illegible]V, [illegible].

"Results of Work on Cereal Rusts," Itogi Nauchno-Issledovatel'skikh Rabot Vsesoiuznogo Instituta Zashchity Rastenii za 193[illegible] Goda, 19[illegible], pp. [illegible]-[illegible].
423.92 L541

SO: SIRA SI 1[illegible] Dec. 19[illegible]3

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001653210004-9"

ST TAN'OV, K. N.

"Air Tempera ure and Duration of the Uredial Stage of Puccinia triticina Erikss.,"
Vestnik Zashchity Rastenii, no. 4, 1940, pp. 132-134. 421 P942

SO: SIRA SI 90-53, 15 Dec. 1953

STEPANOV, K. M.

"Overwintering of Wheat Brown Rust (Puccinia triticina Erikss.)," Vestnik Zashchity Rastenii, no. 5, 1940, pp. 109-124. 421 P 942

SO: SIRA SI 90-53, 15 Dec. 1953

[illegible], [illegible]

"Helminthosporium sativum on Spring Wheat in Altai Region," Sbornik Trudov Vsesoiuznogo Instituta Zashchity Rastenii, no. 1, 1948, pp. 32-42. 464.9 L 5 4 2 S

SO: SIRA SI 90-53, 15 Dec. 1953

[illegible], N. N.

"Sources of Contagious Origin of Infectious Drying up of Lemons (Deuterophoma tracheiphila)," Doklady Vsesoiuznoi Akademii Sel'skokhoziaistvennykh Nauk imeni V. I. Lenina, vol. 15, no. [illegible], 1950, pp. 39-44. 20 Akl

SO: SIRA SI 90-53, 15 Dec. 1953

STEPANOV, K.M., kand.sel'skokhozyaystvennykh nauk; SHALYSHKINA, V.I.

Infection of spring wheat by Helminthosporium in the Altai Territory. Trudy VIZR no.1:32-42 '48. (MIRA 11:7)
(Altai Territory--Wheat--Diseases and pests) (Root rot)

1. STEPANOV, K. M.

2. USSR (600)

7. "Concerning the Types of Affection of Lemons by Infectious Desiccation ('Mal'secco')", Trudy Vsesoyuzn. In-ta Zashchity Rasteniy (Works of the All-Union Institute of Plant Protection), No 3, 1951, pp 143-152.

9. Mikrobiologiya, Vol XXI, Issue 1, Moscow, Jan-Feb 1952, pp 121-132. Unclassified.

CA STEPANOV, K.M.

Can the bark beetle, *Hypothenemus leshovi*, spread dry rot in lemon trees? K. M. Stepanov (All-Soviet Plant Protection Inst., Leningrad). *Mikrobiologiya* 20, 52-7 (1951).—Tests show that *H. leshovi* spreads dry rot in lemon transplants, apparently after contact with *Deuterophoma tracheiphila*. Ordinary fungicidal treatments need insecticidal support. Julian F. Smith

1. STEPANOV, K. M., SHIMAKOVA, A.A.

2. USSR (600)

4. Lemon - Diseases and Pests

7. Periods of infection of lemons by infectious drying-back (mal secco). Dokl Ak sel'-khoz. No. 11 1952.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

Stepanov, K. M.

Stepanov (K. M.) & Shaluishkina (Mme V. I.). Плоды и семена Лимона — источники заразного начала инфекционного усыхания («Мальсекко»). [Lemon fruit and seeds—sources of initial infectious desiccation ('mal secco').]—Микробиология [*Microbiology, Moscow*], 21, 1, pp. 48-51, 1 pl., 1952.

Studies at the Pan-Soviet Scientific Research Institute of Plant Protection, Leningrad, in 1949, showed that all parts of the fruits and seeds of lemons fallen from trees affected with *Deuterophoma tracheiphila* [*R.A.M.*, 33, p. 150] are infested by the fungus. The mycelium was resistant to prolonged low temperature (−25° C.). Transport of lemon fruit and seeds from farms with diseased trees to new farms or areas should be prohibited and seeds tested before use.

STEPANOV, K. M.

STEPANOV (K. M.) & SHALISHKINA (V. I.). К вопросу о корневой инфекции лимонов грибом Deuterophoma tracheiphila Petri. [On the question of Lemon root infection by the fungus *Deuterophoma tracheiphila* Petri.]—Бот. Журн. [*J. Bot. U.S.S.R.* = *Bot. Zh. S.S.S.R.*], 39, 1, pp. 103–108, 1954.

Two series of experiments, one in a tea plantation where citrus had not been grown previously and the other in a lemon plantation infested with wilt (*Deuterophoma tracheiphila*) [*R.A.M.*, 33, p. 350 and next abstract], were carried out in 1949–50 by the Pan-Soviet Institute of Plant Protection, Leningrad, U.S.S.R., to determine whether it was possible to infect lemon roots with the fungus in the field. In each series three treatments were given: (*a*) artificially wounding the collar of year-old Novogruzinsky seedlings on the 9th of June after a period of heavy rain; (*b*) placing green lemon shoots (2 to 6 cm. long) infected with wilt in the soil round the collar of the seedlings on 31st May and on the 9th June wounding the collar and applying the infected shoots to it; and (*c*) same as (*b*) but not wounding the collar. In the second series also infected lemon cuttings with copious mycelium were applied to the wounded collar of seedlings which had been heavily watered before and after (*d*). Owing to unfavourable climatic conditions the second series was retested in the autumn. Though 17 out of 30 (tea plantation) and 21 out of 60 (lemon plantation) seedlings showed brownish colour and were defoliated, none showed infection except one of the eight seedlings in (*d*). In this the entire main root and all the lateral roots were infected. In addition, natural infection of lateral roots occurred in one seedling, indicating that some kind of root infection, though rare, is possible in the field.

Stepanov, K. M.

VORONKEVICH, I.V.; GORLENKO, Mikhail Vladimirovich, professor; ZHURAVLEV, I.I.; NOVOTEL'NOVA, N.S.; STEPANOV, K.M.; KHOKHRYAKOV, M.K.; GAMZAYEVA, M., tekhnicheskiy redaktor

[Fungi, man's friends and enemies] Griby - druz'ia i vragi cheloveka. Pod red. M.V.Gorlenko. Moskva, Gos. izd-vo "Sovetskaia nauka," 1956. 187 p. (MLRA 10:8)
(Fungi)

DOBROZRAKOVA, T.L.; LETOVA, M.F.; STEPANOV, K.M.; KHOKHRYAKOV, M.K., doktor biologicheskikh nauk; AKHREMOVICH, M.B., redaktor; OSMOLOVSKIY, G.Ye., redaktor; CHUNAYEVA, Z.V., tekhnicheskiy redaktor

[Catalog of plant diseases] Opredelitel' bolezhei rastenii. Pod red. M.K.Khokhriakova. Moskva, Gos. izd-vo sel'khoz. lit-ry, 1956. 661 p. (MLRA 10:3)
(Plant diseases)

STEPANOV, K.M., Doc Biol Sci -- (diss) "Fungoid Epiphytoti~~a~~es",

Acad Sci

Lon, 1958, 36 ~~pages~~ (~~AS~~ USSR. Bot Inst im V.L. Komarov), 150 copies

(KL 10-58, 119)

VAKIN, A.T., prof.; GOLOVIN, P.N., prof., doktor biolog.nauk; DOBROZRAKOVA, T.L., dotsent; ZHURAVLEV, I.I., doktor sel'skokhoz.nauk; POLYAKOV, I.M.; SOKOLOV, D.V., dotsent; STEPANOV, K.M., doktor biolog.nauk; TUPENEVICH, S.M., prof.; FEDORINCHIK, N.S., kand.sel'skhokhoz.nauk; FEDOTOVA, T.I., doktor sel'skokhoz.nauk; KHOKHRYAKOV, M.K., doktor biolog.nauk; CHIGAREV, G.A., kand.sel'skokhoz.nauk; YATSENKO, I.P., prof. [deceased]; REUTSKAYA, O.Ye., red.; CHUNAYEVA, Z.V., tekhn.red.

[A phytopathologist's dictionary - reference gook] Slovar'-spravochnik fitopatologa. Moskva, Gos.izd-vo sel'khoz.lit-ry, 1959. 414 p. (MIRA 13:1)

1. Chlen-korrespondent Vsesoyuznoy akademii sel'skokhozyaystvennykh nauk imeni V.I.Lenina (for Polyakov).
(Plant diseases--Dictionaries)
(Russian language--Dictionaries)

STEPANOV, K. M.; CHUMAKOV, A. Ye.; KORSHUNOVA, A. F.; KOZYREVA, G. A.

Development of field crop diseases in 1959. Zashch. rast. ot vred. i bol. 5 no.6:41-44 Je '60. (MIRA 16:1)

(Field crops—Diseases and pests)

STEPANOV, Konstantin Mikhaylovich

[Fungus epiphytotics; on introduction to the general epiphytology of fungus diseases of plants] Gribnye epifitotii; vvedenie v obshchuiu epifitotiologiiu gribnykh boleznei rastenii. Moskva, Izd-vo sel'khoz.lit-ry, zhurnalov i plakatov, 1962. 470 p. (MIRA 16:4)
(Fungi, Phytopathogenic)

STEPANOV, K.M., master

After we adopted the practices of progressive workers, the MKP-23V contactors operate without failure. Elek. i tepl. tiaga 9 no.11:13-14 N '65. (MIRA 19:1)

1. Ispytatel'naya stantsiya depo Moskovka Zapadno-Sibirskoy dorogi.

SIZONENKO, V.L. (Khar'kov); STEFANOV, K.N. (Khar'kov)

Stability of tangential discontinuities in magnetohydrodynamics.
PMTF no.6:23-30 N-D '64 (MIRA 18:2)

KOPYTIN, B.M.; STEPANOV, K.N. (Pyatigorsk)

Diagnosis of chronic pancreatitis; external secretory function of the pancreas and morphophysiological parallels in chronic pancreatitis in dogs. Pat.fiziol. i eksp. terap. 5 no.3:60-64 My-Je '61. (MIRA 14:6)

1. Iz otdela eksperimental'noy bal'neologii (zav. - doktor meditsinskikh nauk A.K.Pislegin) Bal'neologicheskogo instituta (dir. - dotsent I.S.Savoshchenko) na Kavkazskikh Mineral'nykh Vodakh.
(PANCREAS--DISEASES)

Stepanov, K.N. (M)

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Stepanov, K. M., On the propagation of a wave front in a dispersive medium. Dopovidi Akad. Nauk Ukrain. RSR 1955, 63-66. (Ukrainian. Russian summary)

It is shown by the method of characteristics that the equations of propagation of the wave-front in a dispersive medium are the same as those for free space, if it is assumed that the dielectric and magnetic properties of the medium tend to those of free space as the frequency increases without bound. *J. Shmoys* (Brooklyn, N.Y.).

STEPANOV, K.N.

PA - 1918

CARD 1 / 2

SUBJECT USSR / PHYSICS
AUTHOR SITENKO, A.G., STEPANOV, K.N.
TITLE On the Oscillations of an Electron Plasma in a Magnetic Field.
PERIODICAL Žurn.eksp.i teor.fis, 31, fasc.4, 642-651 (1956)
Issued: 1 / 1957

The present work investigates the above mentioned oscillations on the basis of the kinetic theory.

The dispersion equation: Here the free plasma oscillations of a plasma in a constant and homogeneous magnetic field $\vec{H}$ are investigated. The small oscillations of the plasma are described by the linearized kinetic equation: $\frac{\partial f}{\partial t} + \vec{v}\,\frac{\partial f}{\partial \vec{r}} + \frac{e}{m}\vec{E}\,\frac{\partial f_0}{\partial \vec{v}} + \frac{e}{mc}\left[\vec{v}\vec{H}\right]\frac{\partial f}{\partial \vec{v}} = 0$, where $f(\vec{r},\vec{v},t)$ means a small deviation of the distribution function of the electrons from MAXWELL'S function. For the electric selfconsisting field E the following equation applies: $\Delta\vec{E} - \text{graddiv}\,\vec{E} - c^{-2}\partial^2\vec{E}/\partial t^2 = 4\pi c^{-2}\,\partial\vec{j}/\partial t$. For the determination of the dispersion equation the following solution ansatzes are used: $f(\vec{r},\vec{v},t) = f(\vec{v},\vec{k},\omega)e^{i(\vec{k}\vec{r}-\omega t)}$; $E(\vec{r},t) = E(\vec{k},\omega)\,e^{i(\vec{k}\vec{r}-\omega t)}$. The tensor of the dielectricity constant depends not only on the frequency ω, but also on the wave vector $\vec{k}$, i.e. the plasma is a medium with dispersion as to space and time. The dispersion equation establishing the connection between ω and $\vec{k}$ in the plasma is written down. In the general case it is very complicated and therefore only the limiting cases of the weak magnetic field ($\omega_H \ll \Omega$) and of

Žurn.eksp. i teor.fis,31,fasc.4, 642-651 (1956) CARD 2 / 2 PA - 1918

"low temperatures" ($\omega_H >> ks$) are investigated. For these limiting cases the dispersion equation and the refraction indices of the ordinary and extraordinary waves are determined.

There then follows the investigation of the resonance case $\omega \sim \omega_H$. The components of the tensor of the dielectricity constant are determined and inserted into the dispersion equation. The electromagnetic waves are damped at $\omega \sim \omega_H$ and the damping coefficient is much larger than the usual thermal corrections to the refraction coefficients of ordinary and extraordinary waves.

The longitudinal oscillations of the plasma are discussed in a more detailed manner. In the case of the presence of a magnetic field the electromagnetic waves in the plasma cannot be separated into strictly longitudinal and transversal waves, but in the limiting case $n >> 1$ it is possible to separate the longitudinal wave in the plasma and its dispersion equation is written down. In the case of $k_x = 0$ ($\mu = 0$) the magnetic field exercises no influence on the waves which are propagated along this field. At low temperatures there exist two eigenfrequencies of the plasma oscillations and the damping which corresponds to these frequencies is determined. At $\Theta = \pi/2$ no longitudinal waves of a certain frequency domain are able to propagate in the plasma in the case of the presence of a magnetic field.

INSTITUTION: Physical-Technical Institute of the Academy of Science in the USSR.

PA - 2265

Strong Focussing in Linear Electronic Accelerators.

equations of motion of the particle are differential equations with almost periodic coefficients. For the solution of these equations see A.A.SHARSHANOV, Otchet FTI AN USSR (= report of the Physical-Technical Institute of the Ukrainian Academy of Science, reviewers's note). Formulae are given for the amplitude of the oscillations of the particle; furthermore, an expression for the maximum angle difference is given. - An estimation shows that it is necessary to produce magnetic fields with a gradient of $H_n' \sim 10$ - 100 gauss/cm for the focussing of electrons in linear accelerators by magnetic lenses, where the length of the quadrupoles is $l_n \sim 20$ - 200 cm. It is useful to arrange the lenses at great distances from one another in such a way that $D_n \gg l_n$ and $D_n \gg d_n$ applies. (No illustrations).

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED: 19.9.1956
AVAILABLE: Library of Congress

Card 2/2

Shramanov, A. A.

57-27-7-10/40

AUTHORS: Shramanov, A. A., Stepanov, K. N.

TITLE: On the Propagation of Electromagnetic Waves in Almost Periodic Wave Guides (O rasprostranenii elektromagnitnykh voln v volnovodakh, blizkikh k periodicheskim)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1957, Vol. 27, Nr 7, pp. 1474-1481 (USSR)

ABSTRACT: The propagation of electromagnetic waves in a chain of endovibrators connected with each other by small holes and in wave guides "loaded" with dielectric disks is investigated. It is assumed that the systems are almost periodic. At first the equations for the wave-propagation in the chain of endovibrators are derived and the wave propagation with a frequency near to the transmission-band is investigated. Then the wave propagation in the wave guide loaded with dielectric disks is investigated and the system of equations for it is derived. Finally the differential equations with slowly varying coefficients are solved. There are 7 references, 6 of which are Soviet.

ASSOCIATION: Physico-Technical Institute AS Ukrainian SSR, Khar'kov (Fiziko-tekhnicheskiy institut AN USSR, Khar'kov)

SUBMITTED: June 21, 1956

AVAILABLE: 1. Electromagnetic waves-Propagation 2. Wave guides-Applications

Card 1/1

STEPANOV K.N.

57-8-29/36

AUTHORS Stepanov, K.N., Sharshanov A.A.,

TITLE The Strong Focusing in Linear Electronic Accelerators. (Sil'naya fokusirovka v lineynykh elektronnykh uskoritelyakh-Russian)

PERIODICAL Zhurnal Tekhn.Fiz., 1957, Vol 27, Nr 8, pp 1863-1869 (U.S.S.R.)

ABSTRACT The radial motion of a strongly relativistic electron in a linear accelerator with strong focusing is investigated. Magnetic quadrupoles are absorbed along the accelerator. This is carried out in such a way that the n^{th} sector consists of two quadrupoles of a length of l_n (each). The quadrupoles create a magnetic field:

$H_x = \pm H'_n y$, $H_y = \pm H'_n x$, $H_z = 0$

The plus sign refers to the first and the minus sign to the second lens. The first defocuses in direction y and focuses in direction x. The second focuses in direction y and defocuses in direction x. The authors show that for the focusing of electrons in a linear accelerator by means of magnetic quadrupoles it is necessary to produce magnetic fields with a gradient $H'_n \sim$ 1o-5o Gauss/cm and a quadrupole length of $l_n \sim$ 2o - 2oo cm.

(4 Slavic references).

ASSOCIATION Khar'kov Physical Technical Institute of the Academy of Sciences of the Ukrainian SSR. (Fiziko-tekhnicheskiy institut AN USSR, Khar'kov).

SUBMITTED February 9, 1957

AVAILABLE Library of Congress

Card 1/1

STEPANOV, K.N., Cand Phys-Math Sci--(diss) "~~Vibrations of~~ Plasma in external ~~outside~~ fields." Khar'kov, 1958. 7 pp (Min of Higher Education UkSSR. Khar'kov Order of Labor Red Banner State U im A.M. Gor'kiy), 100 copies. Bibliography at end of text (17 titles) (KL,30-58,122)

AUTHORS: Stepanov, K. N., Tkalich, V. S. SOV/57-58-8-28/37

TITLE: On Electron Plasma Vibrations in External Electric and Magnetic Fields (O kolebaniyakh elektronnoy plazmy vo vneshnikh elektricheskom i magnitnom polyakh)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1958, Nr 8, pp. 1789 - 1800 (USSR)

ABSTRACT: This paper gives an account of the study of the propagation of electromagnetic waves in a plasma placed in cross-wise arranged electric and magnetic fields. The thermal motion of the electrons is taken into consideration and the behaviour of the plasma waves is studied in detail. The fundamental equations are laid down and formula (19) for the dispersion is deduced. Several limiting cases involved in this equation are examined. Formulae (39) - (42) are deduced. They take account of the influence of the collision of the electrons with heavy particles per gap width (na shirinu razryvov). In the final part the vortex field is also considered (rot E $\neq$ 0) and the dispersion relation (46) for this case is obtained. The refraction index of the plasma waves is computed from (46).

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SOV/57-58-8-28/37

On Electron Plasma Vibrations in External Electric and Magnetic Fields

All solutions of (46) in the entire frequency range, for which (46) is valid, can only be obtained, if $E_0 = 0$. A. I. Akhiyezer suggested the problem and supervised the work, Ya. B. Faynberg and A. G. Sitenko discussed the results with the authors. There are 9 references, 8 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR, Khar'kov (Physical and Technical Institute, AS USSR, Khar'kov)

SUBMITTED: April 27, 1957

Card 2/2

SOV/58-59-8-18374

Translated from: Referativnyy Zhurnal Fizika, 1959, Nr 8, p 194 (USSR)

AUTHORS: Sitenko, A.G., Stepanov, K.N.

TITLE: On the Interaction Between a Charged Particle and an Electronic Plasma

PERIODICAL: Uch. zap. Khar'kovsk. un-t, 1958, Vol 98, Tr. Fiz. otd. fiz.-matem. fak., Nr 7, pp 5-13

ABSTRACT: The article computes the energy losses of a charged particle moving in a plasma with velocity V. In the computations allowance is made for the thermal motion of both electrons and ions. If $V \gg S_e$ (S_e is the average velocity of the thermal motion of the electrons), then the losses are principally caused by the interaction of the particle with the electrons. When $S_e \gg V \gg S_i$ the contribution of interaction with ions becomes substantial, if

$$\frac{V^3}{S_e^3} \ll \frac{m}{M}$$

(m and M are the masses of the electron and ion respectively). The determination of the magnitude of the losses is also given for the case of highly degenerated electronic gas and for the case where the plasma

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SOV/58-59-8-18374

On the Interaction Between a Charged Particle and an Electronic Plasma

moves as a whole. Neither the thermal motion of the electrons nor the effect of the ions is taken into consideration in the case of an external permanent magnetic field being present. In this case the energy losses due to distant interactions represent Cherenkov radiation. The bibliography has 9 titles.

B.N. Gershman

Card 2/2

AUTHOR: Stepanov, K. N. SOV/56-34-5-35/61

TITLE: The Kinetic Theory of Magnetohydrodynamic Waves (Kineticheskaya teoriya magnitogidrodinamicheskikh voln)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 5, pp. 1292 - 1301, (USSR)

ABSTRACT: This paper discusses the kinetic theory of magnetohydrodynamic waves which propagate in a plasma under an arbitrary angle with respect to the direction of the external magnetic field. The "close collisions" (short-range collisions), which damp the waves, are not taken into account in this paper. Some previous papers are mentioned. For any values of θ the influence of the "close collisions" will be insignificant if $\nu_{collision} \ll \omega$. Here $\nu_{collision}$ denotes the frequency of the collision, and ω denotes the frequency of the magnetohydrodynamic waves. The first part of this paper deals with the dispersion equation. The frequency of the electromagnetic waves in a plasma consisting of electrons and singly ionized ions is assumed to be sufficiently high to neglect the collision integral in the kinetic equation

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for the small deviations $f_\alpha(\vec{r}, \vec{v}, t)$ of the distribution function of the kind α from the equilibrium value $f_{0\alpha}$. (The indices $\alpha = e$ and $\alpha = i$ denote electrons and ions.) The equation which corresponds to these assumptions and an equation for the electric field strength are given in an explicit manner. The calculations are discussed step by step. Expressions are given for the components ε_{11}, ε_{12}, ε_{13}, ε_{23}, and ε_{33}. The kinetic equation may be found for various cases which correspond to limit values:

a) propagation of magnetohydrodynamic waves parallel to the magnetic field. Assuming $\Theta = 0$ one finds $\varepsilon_{11} = \varepsilon_{22}$, $\varepsilon_{13} = \varepsilon_{23} = 0$, $\varepsilon_{33} = 0$, $n'^2 - \varepsilon_{11} \pm \sqrt{-\varepsilon_{12}^2} = 0$.
The last mentioned relation represents the dispersion equation for the ordinary and for the extraordinary electromagnetic waves (which are purely transverse waves in the case $\Theta = 0$). Formulae are then given for the refraction coefficients of the ordinary and extraordinary waves.

b) propagation of magnetohydrodynamic waves under the small angle θ 1 with respect to the direction of the magnetic field. Damping is increased by diminishing the phase velocity.

c) θ 1 Expressions are given and discussed for the refraction coefficient of the ordinary wave.

d) propagation of the extraordinary wave in the case θ 1.

There are 10 references, 7 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR Physical-Technical Institute, AS UkrSSR)

SUBMITTED: December 24, 1957

1. Electromagnetic waves--Theory 2. Particles--Propagation 3. Particles--Disperision 4. Mathematics--Applications

SOV/56-35-1-42/59

AUTHOR: Stepanov, K. N.

TITLE: On the Damping of Electromagnetic Waves in a Plasma Which is Placed in a Magnetic Field (O zatukhanii elektromagnitnykh voln v plazme, nakhodyashcheysya v magnitnom pole)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 35, Nr 1, pp. 283 - 284 (USSR)

ABSTRACT: The damping of a high-frequency electromagnetic wave in a totally ionized plasma is usually defined by the frequency of the collisions of the electrons with the ions $\nu_{eff} = 2\sqrt{2\pi}\, e^4 n_o L/m_e^{1/2} T^{3/2}$. e denotes the charge of the electrons, m_e - their mass, n_o - their density, T - the temperature of the plasma, and L - the Coulomb (Kulon) logarithm. For high temperatures and low densities of the plasma ν_{eff} is low. In this case the damping γ of the electromagnetic waves (which is caused by the thermal motion of the electrons) can be essential. A rather long explicit expression for the damping coefficient γ and an equation

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On the Damping of Electromagnetic Waves in a Plasma Which is Placed in a Magnetic Field

SOV/56-35-1-42/59

for the frequency ω of the wave are given. Several numerical results are then given and discussed in a few lines. The author thanks A.I.Akhiyezer and Ya.B.Faynberg who discussed the results of this paper. There are 4 references which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Physico-Technical Institute of the AS Ukrainskaya SSR)

SUBMITTED: April 11, 1958

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SOV/56-35-5-14/56

24(3), 10(4)

AUTHOR: Stepanov, K. N.

TITLE: Low Frequency Plasma Oscillations in a Magnetic Field (Nizkochastotnyye kolebaniya plazmy v magnitnom pole)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 5, pp 1155-1160 (USSR)

ABSTRACT: Besides high-frequency electron oscillations in the plasma there exist also low-frequency oscillations with the participation of both electrons and ions. Tonks and Langmuire (Ref 1), as well as G. V. Gordeyev (Ref 2) and others developed a theory of these low-frequency oscillations. In the present paper the low-frequency longitudinal electron-ion oscillations in the unlimited (plasma) space, which is in an external constant and homogeneous magnetic field, are investigated. First, a dispersion equation is set up for small plasma oscillations (the plasma consists of electrons and singly charged ions). The equation has the following form:
$An'^4 + Bn'^2 + C = 0$; $n' = kc/\omega'$ ($\vec{k}$ = wave vector, $\omega' = \omega - i\gamma$). The definition of the coefficients is given in the author's previous paper (Ref 3). For $\Lambda(\omega',k) = 1 + K_e + K_i = 0$

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SOV/56-35-5-14/56

Low Frequency Plasma Oscillations in a Magnetic Field

(longitudinal oscillations, curl $E \approx 0$) $K_\alpha (\alpha = e, i)$ is set up (according to Stepanov and Gordeyev (Refs 3, 4)) as a function of Θ (angle between the magnetic field direction $\vec{H}_0$ and $\vec{k}$), and ω_H^α ($\omega_H^\alpha = eH_0/m_\alpha c$; m and e = particle-mass and -charge respectively). The index e applies to electrons, and i to ions. This expression for K_α, which contains also the temperature of the particle gas T and the equilibrium electron density n_0, is transformed into a function of Θ, z and t, where

$z_n^\alpha = (\omega' - n\omega_H^\alpha)/\sqrt{2}\, kv_T^\alpha \cos\Theta$, and the Gaussian error integral (for a complex argument) is written down for f(z,t) according to reference 5 (integral tables by Faddeyeva and Terent'yev) expanded in a series, and for z a small approximation is written down. The dispersion equation is investigated only for the case a) of weak magnetic fields

$(\omega_H^e \ll kv_T^e)$, b) intermediate fields $(1 \ll (\omega_H^e/kv_T^e)^2 \ll m_i T_i/m_e T_e)$

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SOV/56-35-5-14/56

Low Frequency Plasma Oscillations in a Magnetic Field

and c) strong fields ($\omega_H^i \gg kv_T^i$). There are 7 references, 6 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Physico-Technical Institute of the Academy of Sciences of the Ukrainskaya SSR)

SUBMITTED: April 30, 1958

Card 3/3

STEPANOV, K. N.

21(0) PHASE I BOOK EXPLOITATION SOV/2081

International Conference on the Peaceful Uses of Atomic Energy, 2d., Geneva, 1958

Doklady sovetskikh uchenykh; yadernaya fizika (Reports of Soviet Scientists; Nuclear Physics) Moscow, Atomizdat, 1959. 552 p. (Series: Its: Trudy, Vol. 1) 8,000 copies printed.

Eds. (Title page): A.I. Alikhanov, Academician; V.I. Veksler, Academician; and N.A. Vlasov, Candidate of Physical and Mathematical Sciences; Ed. of this volume: S.I. Broodov and D.F. Zaretskiy, Candidates of Physical and Mathematical Sciences; Ed. (Inside book): G.L. Smolyan; Tech. Ed.: Ye.I. Mazel'.

PURPOSE: This collection of articles is intended for scientific research workers and other persons interested in nuclear physics. The volume contains 43 papers presented by Soviet Scientists at the Second Conference on Peaceful Uses of Atomic Energy, held in Geneva in September 1958.

COVERAGE: It is divided into two parts. Part I contains 17 papers dealing with plasma physics and controlled thermonuclear reactions, and Part II contains 26 papers on nuclear physics, including problems of particle acceleration and of cosmic ray physics. The first paper by L.A. Artsimovich presents a review of Soviet work on controlled thermonuclear reactions. The remaining papers in Part I deal with particular problems in this field.

papers in Part II deal in detail with various problems in nuclear physics, such as the fission of heavy atoms and their isotopes, and with the study of cosmic radiation by means of artificial earth satellites and rockets, described in a paper by S.N. Vernov. The Russian-language edition of the proceedings of the conference is published in 16 volumes. The first 6 volumes contain all the papers presented by Soviet scientists as follows: Volume (1), Yadernaya fizika (Nuclear Physics); Volume (2), Yadernyye reaktory i yadernaya energetika (Nuclear Reactors and Nuclear Power); Volume (3), Yadernoye goryucheye i reaktornyye metally (Nuclear Fuel and Reactor Metals), Volume (4), Khimiya radioelementov i radiatsionnykh prevrashcheniy (Chemistry of Radioelements and of Radiation Transformations); Volume 5, Radiobiologiya i radiatsionnaya meditsina (Radiobiology and Radiation Medicine); Volume (6) Polucheniye i primeneniye izotopov (Production and Use of Isotopes). The other 10 volumes contain selected papers presented at the Conference by non-Soviet scientists. In the present volume discrepancies between the English and Russian language edition of the proceedings have been noted in three articles where the texts are not identical: Andrianov, et al, "High Current Pulsed Discharge"; Akhiyezer, et al, "High Frequency Plasma Oscillation"; and Bogolyubov, "Investigations of the Many-body Problem". The serial numbers of reports 2302 and 2304 are reversed in the English edition. Report 2211, by Mikhaylov, et al, is numbered 2536 in the English edition.

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Reports of Soviet Scientists; Nuclear (Cont.) SOV/2081

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17

SOV/56-36-5-23/76

21(7)

AUTHOR: Stepanov, K. N.

TITLE: On the Penetration of an Electromagnetic Field Into a Plasma (O proniknovenii elektromagnitnogo polya v plazmu)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 5, pp 1457-1460 (USSR)

ABSTRACT: Silin (Ref 1) and Shafranov (Ref 2) already investigated the problem of the penetration of an electromagnetic field into a homogeneous electron plasma filling a semi-space in the presence of an external magnetic field vertical to the plasma surface. Ion motion was not taken into account. The author of the present paper investigates the penetration depth of a circularly polarized wave which incides vertically on to the plasma boundary; ion motion is taken into account. The plasma fills the semi-space $z > 0$, the external magnetic field H_0 is vertical to the plasma boundary. The time-dependence of all quantities is assumed to be proportional to $e^{-i\omega t}$ ($\mathrm{Im}\,\omega = -0$), and further the frequency ω should be high enough in order that "short-range" collisions may be neglected. For the case in which electrons and ions are subjected to mirror reflection

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on the plasma boundary, an expression may be obtained from the equations of motion for the electron- and ion distribution functions and from the Maxwell equations for the strength of the electric wave field $E^{(\pm)}(z)$, with the aid of which formulas for the penetration depths of the magnetic and the electric field may be computed. The author thanks A. I. Akhiyezer and M. Ya. Azbel' for their valuable advice. There are 2 references.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Physico-technical Institute of the Academy of Sciences, Ukrainskaya SSR)

SUBMITTED: November 15, 1958

86806

S/185/60/005/001/005/018
A151/A029

26.1410 also 2407, 2507

AUTHORS: Dolgopolov, V.V.; Stepanov, K.M.

TITLE: The Damping of Magneto-Hydrodynamic Waves in a Rarefied Plasma.

PERIODICAL: Ukrayins'kyy Fizychnyy Zhurnal, 1960, Vol. 5, No. 1, pp. 59 - 64

TEXT: This article deals with the propagation of magneto-hydrodynamic waves in an unlimited plasma consisting of electrons and ions. The investigation is based on the kinetic theory and allowance is made for the "close" collisions between the particles of the plasma. A description is given of the perturbation of the plasma by a magneto-hydrodynamic wave with a small amplitude. This wave passes through the plasma by small deviations f_α (r,p,t) of the functions of the distribution of electrons and ions along coordinates and pulses. The functions f_α are determined from kinetic equations (1), where the collision integral $\frac{\partial J_i}{\partial p_i}$ was taken in Landau's form (Ref. 5). The self-coordinated electrical field is determined from equation (2). The equations (1), (2) are solved according to Fourier-Laplace's method whereby a dispersion equation is found which connects the complex frequency ω and the wave vector k. The solution of equation (1) for the Fourier-Laplace's components is effected in the form of an expansion in a row

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The Damping of Magneto-Hydrodynamic Waves in a Rarefied Plasma

according to the degrees $\frac{\nu}{\omega}$ (ω is the damping coefficient). In the case of the propagation of waves along the field H_0, the dispersion equation for magneto-[illegible] dynamic waves has the form (7). In the case $\nu_i = 0$ (ν_i - effective frequency of collisions between ions), the equation (7) coincides with the dispersion equation obtained by Hershman (Ref. 1). At $\nu_i = 0$, (7) yields the dispersion equation, obtained in the work of Ginzburg (Ref. 4). The first item in (7) which determines the damping is conditioned by the collisions of electrons with ions, the second item determining the damping by the ion-ion collisions. It follows from (7), that the ion-ion collisions may be neglected for waves with a high phase speed, when $V_{ph.sp}^2 = V_A^2 \gg \sqrt{\frac{M}{m}} v_i^2$. In the case of $V_A^2 \sim \sqrt{\frac{M}{m}} v_i^2$ the ion-ion collisions make the same contribution to damping as the ion-electron collisions. In the case of $V_A \sim v_i$ (and especially at $V_A < v_i$), the damping of magneto-hydrodynamic waves is determined only by collisions between ions. For a magneto-hydrodynamic wave propagating perpendicularly to H_0 (this wave is similar to the "quick" magnetosonic wave of magnetic hydrodynamics), the dispersion equation has the form (11). The frequency and damping of the magneto-hydrodynamic wave is determined by the expressions (12) and (13). The first item in (13) is conditioned by electron-ion collisions, the second by the collisions between electrons, the third by the collisions of elec-

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trons with ions. It follows from (13) that in the case of $V_{\phi}^2 = V_A^2 \gg v_1^2 \frac{\omega_H^e \omega_H^i}{\omega^2}$ the damping of magneto-hydrodynamic waves is determined only by electron-ion collisions (the first item in (13)). In this case, the waves propagating perpendicularly to H_0 become damped approximately in the same way as waves which are propagating along H_0. If, however, $V_A^2 \ll v_1^2 \frac{\omega_H^e \omega_H^i}{\omega^2}$, then the damping of waves is determined by the two last items in (13). In this instance, the waves propagating across the magnetic field are damped more intensely than those propagating along the magnetic field. The calculations made show that the dissipation of the energy of magneto-hydrodynamic waves in a rarefied plasma which appears as the result of the "close" collisions of particles, may prove to be considerably higher than it is indicated by the phenomenological theory (biliquid specimen of the plasma) making allowance only for the electron-ion collisions. There are 5 Soviet references.

ASSOCIATION: Fizyko-tekhnichnyy instytut AN URSR (Physico-Technical Institute, AS UkrSSR).

SUBMITTED: June 20, 1959

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S/057/60/030/008/015/019
B019/B060

AUTHOR: Stepanov, K. N.

TITLE: On the Motion of a Strongly Relativistic Electron in a Linear Accelerator Under the Action of Random Disturbances

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol. 30, No. 8, pp. 975-980

TEXT: The author studies the transverse motion of a strongly relativistic electron in a very long linear accelerator under the action of forces caused by the statistic compensation errors of the terrestrial magnetic field and by the appliances of the accelerator sections. The author specifies the differential equation (1) for the deviation of particles from the accelerator axis, and therefrom obtains equations (5) by integration. The mean value of the fluctuations and the mean value of the square fluctuations of the disturbing random force acting upon the electron are given by (6). Formulas (11) and (11') are then derived for the mean square deviation of the electron beam. It is then established that the Fokker-Plank-Kolmogorov equation supplies the probability density for the distribution function,

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On the Motion of a Strongly Relativistic Electron in a Linear Accelerator Under the Action of Random Disturbances

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and that the deviation of the electron beam lies within a certain range. Formulas (25) and (28) are obtained by an extensive expansion for the distribution functions and mean values. It follows from the foregoing that the deviation of particles under the action of random forces in the case where the energy increases no more in the section $z > z_1$ becomes larger much more quickly than in the case of the particle energy increasing also in this section (the z-axis being the accelerator axis). This effect is related to the relativistic mass increase on acceleration. The author thanks I. A. Grishayev, O. V. Kovalev, and N. N. Mocheshnikov for their discussions of results and advice given. There is 1 Soviet reference.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR Khar'kov (Physico-technical Institute of the AS UkrSSR, Khar'kov)

SUBMITTED: December 24, 1959

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STEPANOV, K.N.

Cyclotron absorption of electromagnetic waves in a plasma. Zhur. eksp. i teor. fiz. 38 no.1:265-267 Jan '60. (MIRA 14:9)

1. Fiziko-tekhnicheskiy institut AN USSR.
(Electromagnetic waves) (Plasma (Ionized gases))

83597

S/056/60/038/005/030/050
B006/B070

26.2311
26.2537

AUTHORS: Stepanov, K. N., Pakhomov, V. I.

TITLE: Magnetic Bremsstrahlung of a Restricted Plasma

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 5, pp. 1564 - 1568

TEXT: The present paper is a contribution to the topic of controlled thermonuclear reactions (energy equilibrium in the thermonuclear reactor, microwave diagnostics of a plasma). The authors make a theoretical study of the magnetic bremsstrahlung emitted by a restricted high-temperature plasma placed in a strong magnetic field. For this purpose, it is assumed that the magnetic pressure p_H is much higher than the pressure p_e of the electron gas. $p_H \gg p_e + p_i$ (p_i - ion gas pressure) is a necessary condition for the formation of equilibrium plasma configurations, which guarantees the stability of the configuration. The electron plasma considered moves in the $\vec{H}$ field in a spiral along the lines of force, emitting electromagnetic waves of the frequency (1):

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$\omega = s\omega_H/(1 - v_{\parallel} n_j \cos\theta/c)$, $s = 1,2\ldots$ ($\omega_H = eH/mc$, the electron gyro-frequency; e, m, and $v_{\parallel}$, the charge, mass, and the projection of $\vec{v}$ onto $\vec{H}$, respectively; n_j, the refractive index of the two normal waves (the ordinary and the extraordinary) which can be propagated in the plasma; Θ, the angle between $\vec{H}$ and the direction of propagation of the waves). It is further assumed that $\beta = v_T/c = (T_e/mc^2)^{1/2} \ll 1$ (T_e - temperature of the electron gas). It is assumed that the waves corresponding to the first harmonic of equation (1) propagate in the plasma, that is, for them $n_j^2 > 0$. That is the case if $\Omega/\omega \lesssim 1$. Then, $n_j \sim 1$ and $\omega \approx s\omega_H$ (Ω - Langmuir frequency of the electron). The whole radiation consists of single lines ($\omega_H, 2\omega_H, \ldots$) which are broadened on account of the Doppler effect, and have a half-width of $\Delta\omega \sim s\omega_H \beta \cos\Theta$. Only the case of non-overlapping harmonics is considered here. Singularities of the magnetic field lead to additional line broadening. The authors assume that the singularities are sufficiently small so that $\Delta H/H \lesssim \beta$, and the

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field may be assumed to be homogeneous. Under these assumptions, the propagation of waves with $\omega \sim s\omega_H$ (which are strongly absorbed in the high-temperature plasma - cyclotron absorption) is studied, that is to say, the tensor components of the dielectric constant (ε_{ij}) are determined. Then, expressions for the attenuation factor are derived for two special cases. The emissivity of the plasma is investigated, and some expressions are obtained for the total and individual intensities of radiation. The problem of the intensity of thermal radiation in the region of resonance frequencies is discussed in the last section of the paper. An investigation on the same lines was earlier made by V. L. Ginzburg and V. V. Zheleznyakov. A. I. Akhiyezer, M. A. Leontovich, and Ya. B. Faynberg are thanked for discussions. B. A. Trubnikov is mentioned. There are 10 references: 9 Soviet and 1 Australian. X

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Institute of Physics and Technology of the Academy of Sciences Ukrainskaya SSR)

SUBMITTED: December 9, 1959

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24.2120
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AUTHORS: Kitsenko, A. B., Stepanov, K. N.

TITLE: The Instability of a Plasma With Anisotropic Ion and Electron Velocity Distribution

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 6, pp. 1840 - 1846

TEXT: L. I. Rudakov and R. Z. Sagdeyev (Ref. 1) showed that pressure anisotropy in a rarefied plasma leads to instability; R. V. Polovin and N. L. Tsintsadze (Ref. 2) have generalized the results of these investigations for the case in which the Van Alfvèn velocity is of the order of the velocity of light. These authors operated with the quasi-hydrodynamic approximation which is applicable to such plasma motions in the case of which no pressure transfer takes place along the magnetic lines of force. In the present paper, the low-frequency oscillations of an unbounded plasma are investigated with an anisotropic velocity distribution of electrons and ions on the basis of the kinetic equation (1). Special cases of this group of problems have already been dealt

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The Instability of a Plasma With Anisotropic Ion and Electron Velocity Distribution

with by A. A. Vedenov and R. Z. Sagdeyev. In the approximation
$|\omega'| \ll \omega_{Hi}$, $\vec{k}^2 \vec{v}_i^2 \ll \omega_{Hi}^2$, where $\vec{k}$ is the wave vector and $\omega_{H\alpha} = e_\alpha H_o/m_\alpha c$,
and when the Van Alfvèn velocity is low compared to c, the dispersion
equations for the electro-magnetic waves in a plasma decompose in (4):
$n^2\cos^2\Theta - \varepsilon_{11} = 0$, and (5): $n^2 - \varepsilon_{22} - \varepsilon_{23}^2/\varepsilon_{33} = 0$; ε_{ij} denotes the
tensor of the dielectric constant, $n = kc/\omega'$, $\omega' = \omega - i\gamma$, Θ - the angle
between $\vec{k}$ and $\vec{H}_o$; the index α refers either to electrons (e) or ions (i).
The values of ε_{ij} are defined by the equations (6), and the integrals
occurring therein are also given. The frequency of the ordinary magneto-
hydrodynamic wave, which is analogous to the Alfvèn wave in magneto-
hydrodynamics, is described by equation (4). Herefrom it is possible to
obtain an explicit expression for ω'^2, which is equal to that obtained
in quasihydrodynamic approximation. (5) determines the frequency of the
"extraordinary" magnetohydrodynamic wave and the "sound wave" (which are

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The Instability of a Plasma With Anisotropic Ion and Electron Velocity Distribution

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analogous to the fast and the slow magnetoacoustic wave in magnetohydrodynamics). In the following, this dispersion equation (5) is applied to several special cases, and it is shown to what extent simplifications may be obtained in this case: a) strong magnetic field, b) highly non-isothermal plasma, c) the thermal energy of motion in the direction parallel to $\vec{H}_o$ is considerably greater than in the direction that is perpendicular hereto, d) this energy is considerably greater in the direction perpendicular to $\vec{H}_o$ than in the direction that is parallel to $\vec{H}_o$, and e) $|\omega'| \ll |k_{\parallel}\overline{v_{\parallel i}}|$. The authors finally thank A. I. Akhiyezer, V. F. Aleksin, R. V. Polovin, and V. I. Yashin for advice and discussions. There are 1 figure and 6 references: 4 Soviet and 2 British.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Institute of Physics and Technology of the Academy of Sciences of the Ukrainskaya SSR)

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SUBMITTED: January 12, 1960

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S/185/61/006/003/001/010
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24.2120 (3717, 3817)

AUTHORS: Kitsenko, O.B. and Stepanov, K.M.

TITLE: Passage of a beam of charged particles through a magnetic plasma

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 6, no. 3, 1961, 297-305

TEXT: If a beam of particles with isotropic distribution function passes through a magnetic plasma, "slow" electromagnetic waves may be excited by either Cherenkov or cyclotron excitation; both are related to the anomalous Doppler-effect. If the distribution function is anisotropic, new effects can arise; in particular, waves related to the normal Doppler effect can be excited as quoted by V.V. Zheleznyakov (Ref. 7: Izv. VUZ'ov MVO SSSR, Radiofizika, 3, 57, 1960). With the anomalous Doppler-effect and thermal motion of the particles along the magnetic field, excitation as well as damping of waves is possible. Instability develops also if the beam is at rest, ($v_0 = 0$). In the present work, the effect of an anisotropic

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distribution function of particles on the excitation of electromag-netic waves in a plasma is considered. The distribution function is chosen in the form

$$f_{0\alpha}(v_{\perp}, v_{\parallel}) = \frac{n_0'}{(2\pi)^{1/2} v_{\perp} v_{T\alpha}} \delta(v_{\perp} - v_{\perp 0}) \exp\left\{-\frac{(v_{\parallel} - v_0)^2}{2v_{T\alpha}^2}\right\} \quad (1.5)$$

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where $v_T = \sqrt{\frac{T_\alpha}{m_\alpha}}$, T_α - the "longitudinal" temperature of the beam, n_0' - the density of the beam. The velocity of the beam is non-relativistic. For the distribution (1.5), the increments are of the same order of magnitude for the first harmonics, since the length of the excited wave is of the same order as the Larmor radius of the particles. The dispersion equation for plane waves in the system plasma-beam has the form

$$An^4 + Bn^2 + C = 0 \quad (2.1)$$

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$$A = \varepsilon_{33}\cos^2\theta + \varepsilon_{11}\sin^2\theta + 2\varepsilon_{13}\cos\theta\sin\theta,$$
$$B = 2(\varepsilon_{12}\varepsilon_{23} - \varepsilon_{22}\varepsilon_{13})\cos\theta\sin\theta + \varepsilon_{13}^2 - \varepsilon_{11}\varepsilon_{33} -$$
$$-(\varepsilon_{22}\varepsilon_{33} + \varepsilon_{23}^2)\cos^2\theta - (\varepsilon_{11}\varepsilon_{22} + \varepsilon_{12}^2)\sin^2\theta,$$
$$C = \varepsilon_{33}(\varepsilon_{11}\varepsilon_{22} + \varepsilon_{12}^2) + \varepsilon_{11}\varepsilon_{23}^2 + 2\varepsilon_{12}\varepsilon_{23}\varepsilon_{13} - \varepsilon_{22}\varepsilon_{13}^2, \quad (2.2)$$

The permittivity-tensor of the plasma with beam has the form

$$\varepsilon_{ij} = \varepsilon_{ij}^{(0)} + \varepsilon'_{ij} \quad (2.3)$$

$\varepsilon_{ij}^{(0)}$ being the permittivity-tensor of a cold plasma, and ε'_{ij} an additional term due to the beam.

$$\varepsilon_{11}^{(0)} = \varepsilon_{22}^{(0)} = 1 - \sum_\alpha \frac{\Omega_\alpha^2}{\omega^2 - \omega_{H_\alpha}^2}, \quad \varepsilon_{33}^{(0)} = 1 - \sum_\alpha \frac{\Omega_\alpha^2}{\omega^2}, \quad (2.4)$$
$$\varepsilon_{12}^{(0)} = -i\sum_\alpha \frac{\Omega_\alpha^2 \omega_{H_\alpha}}{\omega(\omega^2 - \omega_{H_\alpha}^2)}, \quad \varepsilon_{13}^{(0)} = \varepsilon_{23}^{(0)} = 0.$$

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Passage of a beam...

The excitation of the following types of slow electromagnetic waves is examined: Longitudinal plasma oscillations in the magnetic field, quasi-longitudinal electromagnetic plasma-waves, and ion-cyclotron and magneto-hydrodynamic waves. The dispersion equation for longitudinal oscillations has the form (3.1)

$$A = \varepsilon_{33}\cos^2\theta + \varepsilon_{11}\sin^2\theta + 2\varepsilon_{13}\cos\theta\sin\theta = 0.$$

If the thermal motion of the electrons is neglected, the form

$$1 - \frac{\Omega^2\cos^2\theta}{\omega^2} - \frac{\Omega^2\sin^2\theta}{\omega^2-\omega_H^2} - \sum_s\left[\frac{\Omega'^2\cos^2\theta I_s^2}{(\omega - s\omega_H - k_\parallel v_0)^2} + \frac{2\Omega'^2\sin^2\theta s I_s I_s'}{a\omega_H(\omega - s\omega_H - k_\parallel v_0)}\right] = 0. \quad (3.4)$$

is assumed; its solution is sought in the form (3.5)

$$\omega = k_\parallel v_0 + s\omega_H + \varepsilon, \; |\varepsilon| \ll |k_\parallel v_0 + s\omega_H|$$

If $\nu = k_\parallel v_0 + s\omega_H$ is not close to the eigenfrequency ω_+ or ω_-,

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then the increment is determined by

$$\varepsilon = \varepsilon_0 |I_s(a)|, \quad \varepsilon_0^2 = \frac{(\nu^2 - \omega_H^2)\nu^2\Omega'^2 \cos^2\theta}{(\nu^2 - \omega_+^2)(\nu^2 - \omega_-^2)}. \tag{3.6}$$

if $\nu \approx \omega_\pm$, the increment is given by

$$\frac{\varepsilon}{\omega_\pm} = \frac{-1 + i\sqrt{3}}{2^{4/3}} \left(\frac{\Omega'^2 \cos^2\theta I_s^2}{\omega_\pm^2 K_\pm} \right)^{1/3}, \tag{3.7}$$

where

$$K_\pm = \frac{\Omega^2 \cos^2\theta}{\omega_\pm^2} + \frac{\Omega^2 \omega_\pm^2 \sin^2\theta}{(\omega_\pm^2 - \omega_H^2)^2}.$$

If the density of the beam is small, the increment is given by

$$\frac{\varepsilon}{\omega_\pm} = -\frac{i\sqrt{\pi}\Omega'^2}{2K_\pm k^2 v^2_T} e^{-z_s^2} \left(z_s I_s^2 + \frac{2s\sqrt{uy_0''}}{a} I_s I_s' \right) \tag{3.13}$$

From (3.13) it follows that cyclotron excitation as well as damping may arise for the anomalous as well as the normal Doppler-effect.

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